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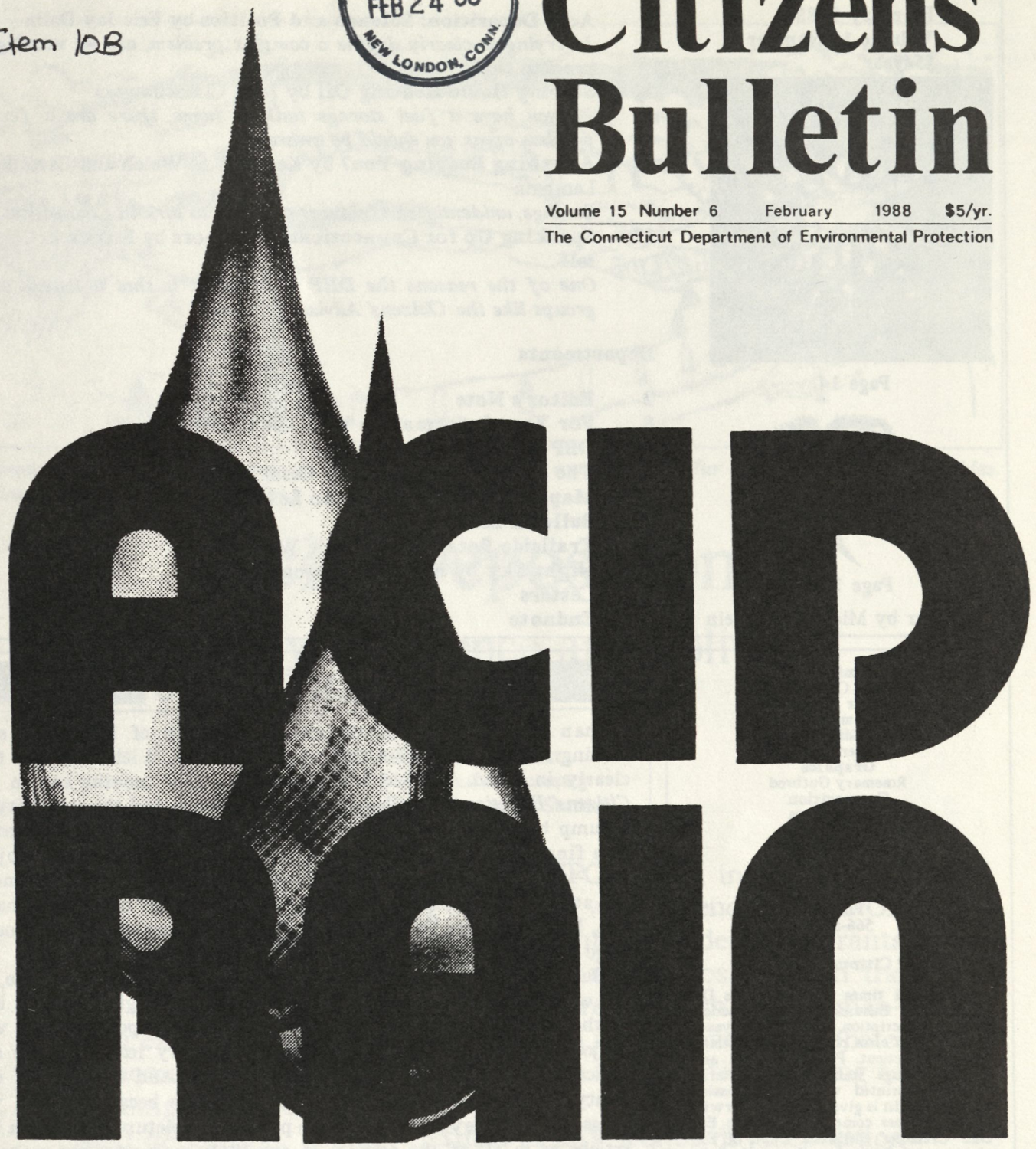

ACID RAIN

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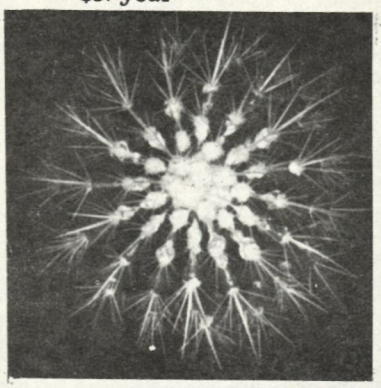

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Cover by Michael D. Klein

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DEP Citizens' Bulletin

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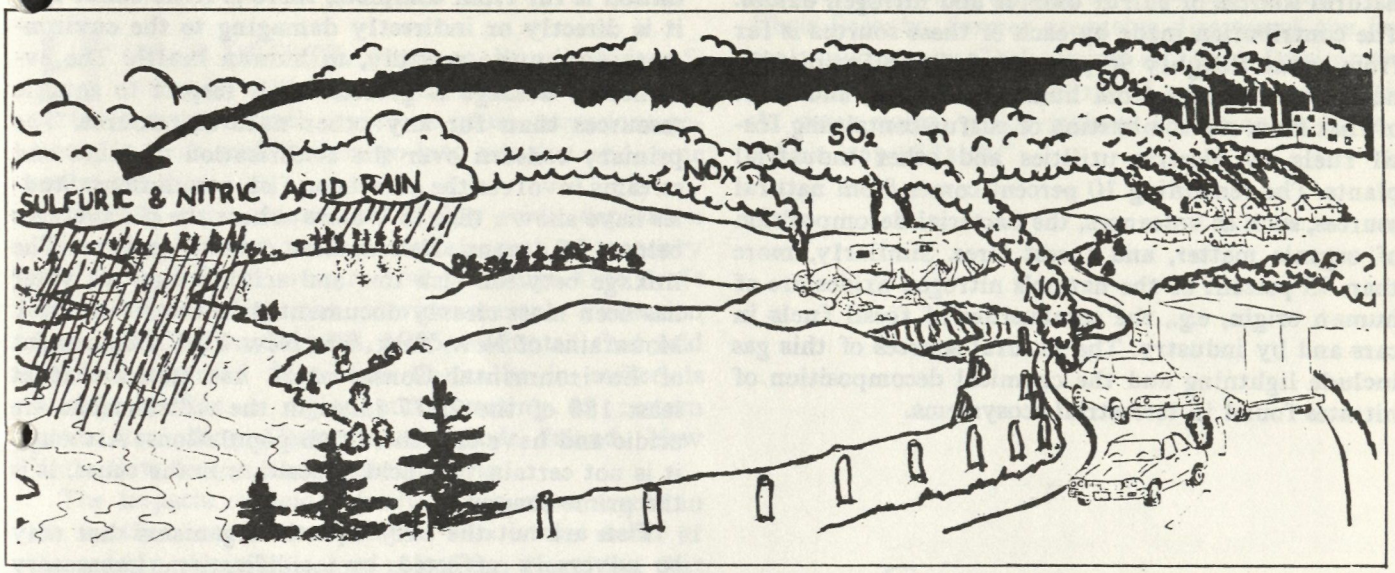
Editor's Note

Human beings, let us remember, are creatures of limitation, still lacking the absolute, definitive vision of things. With that basic fact clearly in mind, we had a lead article a few months ago in the *Citizens' Bulletin* on low level radioactive waste and the possiblity of a dump being planned in Connecticut. The article was not meant to be a final statement, only a brief introduction to a complex subject, and -- with luck -- an encouragement to the reader to find out more. For at least one of our readers, this is exactly what happened. Thank you, Mrs. Sylvester Deming of Cheshire, for being concerned enough to go a little deeper.

Our lead article this month is on acid deposition. (The article, by the way, was submitted by another reader, which gives you an idea of the kind of operation we have here.) Acid deposition is a vast subject, complicated not only by the chemistry involved, the statistical analysis which must be drawn upon, and the lack of certainty in regard to cause and effect, but also because -- yes, you guessed it -- money and politics are part of the picture. And so, in this article, as in all of the articles in our little magazine, we make no claim to being the last word on the subject. We don't know the final answer. We are human beings and are not permitted that. All we are permitted to do is to try, within the rigid confines of our miniscule presence in time and space, is to do our best, as intelligently, as responsibly, as humanely as we can. So, in that spirit, we present our February issue. Hope you find something here that stimulates your interest.

R.P.



The precursors of acid deposition are man-made and natural sources of sulfur dioxide and nitrogen oxides. (Reprinted from a DEP publication.)

Acid Deposition

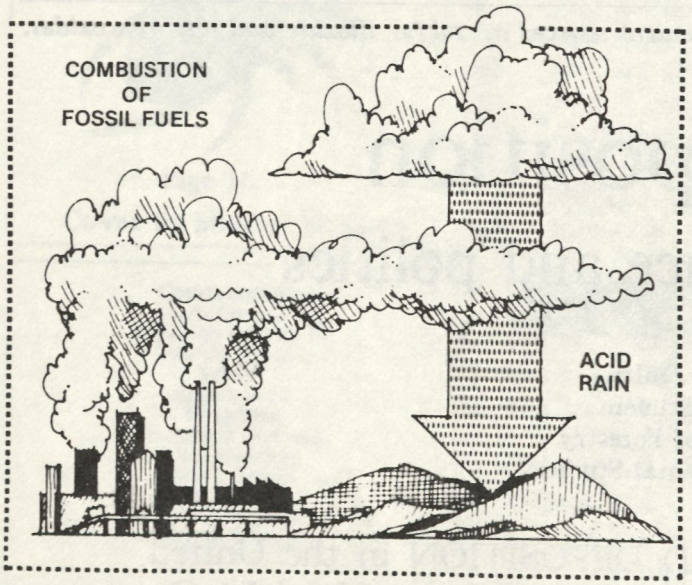
A story of science and politics

by
Eric Jay Dolin
Graduate Student
Yale School of Forestry
and Environmental Studies

THE DEBATE OVER ACID DEPOSITION in the United States has been raging for years, with no end in sight. On one side are those who argue that scientific evidence warrants immediate legislative action to reduce acid deposition. On the other side are those who argue for more research before mandating expensive legislative controls. To understand this debate, it is necessary to grasp both the science and politics relating to this complex issue.

Acid deposition, usually defined as any wet or dry deposition ($pH < 5.6$) of acid-contributing sulfates and nitrates, is hardly a new phenomenon. The term "acid rain" was coined in 1872 by Robert Angus Smith, an English chemist. Since that time, over 3,000 scientific papers and a half-dozen major government reports have been written on the subject, most within the last 30 years.

THE PRECURSORS of acid deposition in the United States are anthropogenic (human-made) and natural sources of sulfur dioxide and nitrogen oxides. The contribution made by each of these sources is far from equal. Roughly 90 percent of the sulfur dioxide nationwide results from human activities, and most of that from the combustion of sulfur-containing fossil fuels by electric utilities and other industrial plants. The remaining 10 percent comes from natural sources, such as volcanoes, the bacterial decomposition of organic matter, and forest fires. Similarly, more than 95 percent of the nation's nitrogen oxides are of human origin, e.g., the combusiton of fossil fuels in cars and by industry. The natural sources of this gas include lightning and the chemical decomposition of nitrates found in terrestrial ecosystems.



When the acidic balance is thrown off, natural and mildly acidic rain becomes precipitation with far-reaching environmental effects. (Reprinted from an EPA publication.)

WHEN THEY REACH the atmosphere, emissions of sulfur dioxide and nitrogen oxides can be transformed into sulfuric and nitric acids, which are then brought down to earth by wet or dry deposition as sulfates and nitrates. The distance over which this process occurs is unclear. Some studies suggest that a large percentage of sulfur dioxide and nitrogen oxides emitted into the atmosphere fall as acid deposition hundreds of miles away from their source. Other studies point more to localized emissions sources.

Although understanding of the effects of acid deposition is far from complete, there is little doubt that it is directly or indirectly damaging to the environment and, quite possibly, to human health. The evidence of damage is greater with respect to aquatic resources than for any other natural resource. The primary concern over the acidification of lakes and streams involves the effects on fish populations. Studies have shown that in waters where the pH averages below 5.0, many fish species cannot survive. The linkage between fish loss and acidification of water has been most clearly documented in the Adirondack Mountains of New York. The New York Department of Environmental Conservation has stated that at least 180 of the 2,877 lakes in the Adirondacks are acidic and have lost their fish populations. Although it is not certain that acid deposition is the cause, it is the prime suspect.

Fish are not the only aquatic organisms that may be adversely affected by acidification. Laboratory studies have shown that in waters where the pH averages below 5.0, nearly all molluscs, and many groups of bottom-dwelling invertebrates, die off. And a recent study by the Izaak Walton Leaque suggests that the decline of the black duck over the past 30 years may be an indirect result of acid deposition. According to the study, as waters become more acidified, they cannot support the mollusks, insects, and fish which are the primary food sources for the ducks. Ring-necked ducks, hooded mergansers, and the common loon depend on many of the same food sources as the black duck, and may also be at risk.

AQUATIC RESOURCES are just one of the natural resources threatened by acid deposition. There is much concern in North America and Europe over widespread forest decline. In the United States the best documented dieback has involved red spruce (*Picea rubens*) in the high elevation forests of Vermont, New Hampshire, and New York.

It may be that acid deposition is partly to blame. The affected forests are located in areas that receive particularly high levels of acid deposition. This is especially true at higher elevations where trees are bathed in extremely acidic (average pH – 3.5) cloud moisture for up to one fourth of each year. In the winter months, this moisture can collect on the trees as ice. Furthermore, one hypothesis suggests that aluminum, a phytotoxic element, is mobilized when acid deposition falls on already acidic forest soils. Increased aluminum concentrations at root-depth in the soil, in turn, may destroy fine root hairs or result in abnormal root growth and development. This decreases the ability of trees to absorb moisture and nutrients,

making them more susceptible to damage in times of drought.

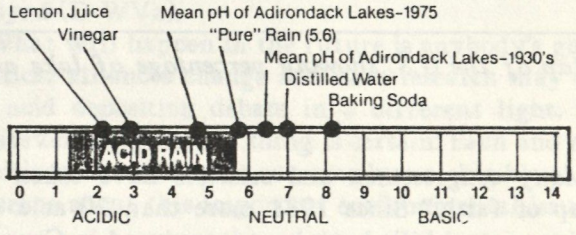
HUMAN HEALTH, too, may be adversely affected by acid deposition. Acidic waters transported through metal pipes can cause corrosion; potentially toxic metals then go into solution and come out at the tap.

There is also concern that highly acidic deposition is corroding human-made materials, such as masonry and paint finishes on cars and buildings. One draft study released by the Environmental Protection Agency (EPA) on July 18, 1985, estimated that acid deposition caused $7 billion annually in materials damage within a region encompassing 17 eastern states, including Connecticut, Rhode Island, New York, New Jersey, and Massachusetts.

The impacts of acid deposition are most severe in the northeastern United States. This is the result of the combination of the low pH of the deposition that falls in the region and the limited buffering (neutralizing) capacity of the soils found there. Thus, the acid deposition falling in the Northeast retains much of its strength as it falls on cities and towns and courses through ecosystems. Studies of major waterbodies in Connecticut, however, have not shown acidification as an immediate threat to water quality. This is based upon good buffering capacities that exist in the soils found in most of Connecticut. Thus, while acid deposition may impact the pH of waterbodies and streams, the effect in reducing the overall pH to levels harmful to fish other aquatic life has not beed reached, according to studies that have been made so far.

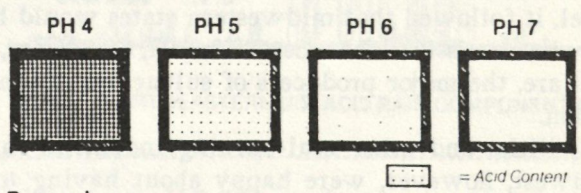
The northeast, however, is not the only region being affected. Recent studies have shown that highly acidic deposition is falling in Michigan, Wisconsin, Minnesota, Colorado, and parts of the south.

THERE IS DISAGREEMENT as to how all this should be interpreted politically. Many claim that legislation to reduce emissions of sulfur dioxide and nitrogen oxides is premature because not enough is yet known about the causes and effects of acid deposition. Others believe that despite the gaps in our knowledge we know enough to take action. According to the Acid Rain Peer Review Panel appointed by President Reagan in 1982, and which reported its findings in 1983, "It is the nature of the acid deposition problem, that actions (which will result in meaningful reductions in the emissions of sulfur compounds into the atmosphere) have to be taken despite incomplete knowledge. If we take the conservative point of view that we must wait until scientific knowledge is definitive, the accumulated deposition and damaged environment may reach irreversibility." Chris Bernabo, former executive director of the Federal Interagency Task Force on Acid Precipitation stated, "We can never get rid of all the uncertainties. At some point, policy-makers are going to have to take a leap of faith."



The pH Scale

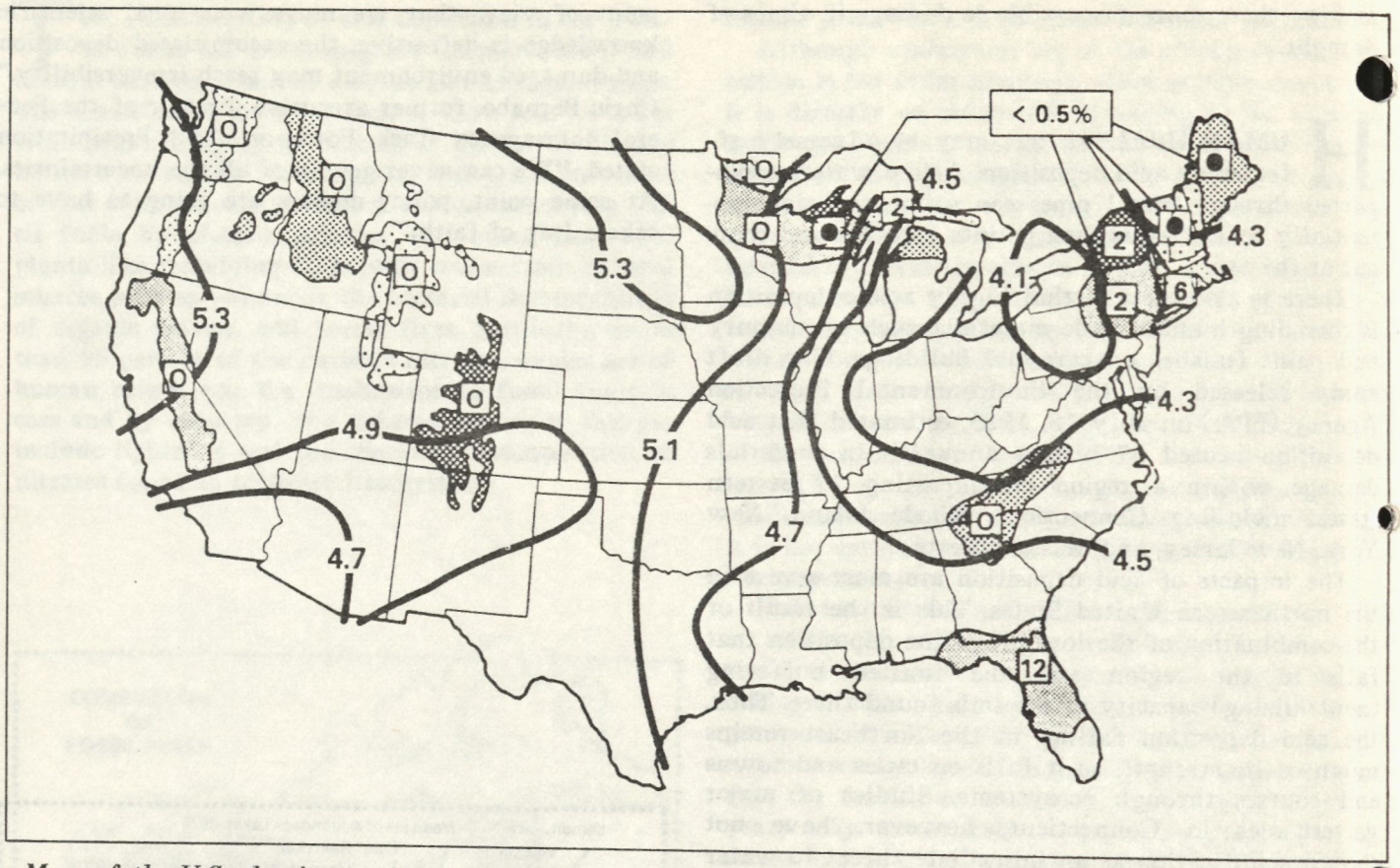
The pH ("potential hydrogen") scale is a measure of hydrogen ion concentration. Hydrogen ions have a positive electrical charge and are called cations; ions with a negative electrical charge are known as anions. A substance containing equal concentrations of cations and anions so that the electrical charges balance is neutral and has a pH of 7. However, a substance with more hydrogen ions than anions is acidic and has a pH less than 7; substances with more anions than cations are alkaline and have pH measures above 7. Thus, as the concentration of hydrogen ions increases, the pH decreases. But the pH scale says nothing about whether the cations or anions are from natural or manmade sources; a hydrogen ion from an industrial smokestack measures the same on the scale as a hydrogen ion from natural minerals.



Remember

The *lower* the pH value, the *higher* the acid content. Each full pH unit *drop* represents a *tenfold* increase in acidity.

(Reprinted from an EPA publication.)



Map of the U.S. showing percentage of lake area with pH < 5.0. (From an EPA publication.)

Many congressmen and senators have taken this "leap of faith." Since 1981 more than 20 acid deposition control bills have been introduced in Congress, but only two, on the Senate side, have been reported out of committee. Neither was taken up on the Senate floor.

A number of the early bills, introduced in the 97th Congress (1981-1982), established a 31-state acid rain mitigation region, comprising all those states bordering on and east of the Mississippi River. Each state in this region would be required to reduce overall emissions of sulfur dioxide by a specific date. This requirement did not affect all 31 states equally. Indeed, because individual state reductions were based on the percentage of total regional emissions of sulfur dioxide contributed by that state above a certain base level, it followed that midwestern states would have to reduce emissions the most. After all, they were, and still are, the major producers of sulfur dioxide in the region.

Utilities and other coal-burning industries in the midwest, however, were happy about having to reduce their emissions the most. They argued that the use of stack scrubbers or switching to low-sulfur coal would be too expensive. According to some estimates, the first year of compliance with one of the proposed bills would cost $3 billion, most of which would be paid by the midwestern states. Midwestern utilities argued that these costs would be passed on to consumers in the form of higher electricity rates. Because consumers are also constituents, this argument was enough to convince most midwestern legislators to oppose the acid deposition control bills being considered. In addition, many midwestern utilities and legislators felt that there was little or no proof that acid deposition was causing any damage and even if there were solid proof, the damage cause was considered the northeast's problem, not the midwest's.

ANOTHER POWERFUL GROUP opposed to these early bills was the many coal companies located in the midwest and the east. Much of the coal coming from these regions is higher in sulfur content than western coal. Thus, one way for utilities to reduce sulfur emissions was to switch from high-sulfur midwestern and eastern coal to western coal. Midwestern and eastern legislators and the coal companies selling high-sulfur coal wanted none of that, especially when their states were going through economic slumps. Western legislators from coal-mining states, however, seeing an economic opportunity in fu-

el-switching, gave mild support to the early bills.

THE OPPOSITION WON OUT and all of the bills died in the various committees at the end of the 97th Congress. Instead of giving up, the proponents of legislation drafted another series of bills designed to make acid deposition controls politically acceptable to legislators in the midwest and the eastern states with high-sulfur coal. One of the bills would significantly reduce annual emissions of sulfur dioxide and nitrogen oxide in the 48 contiguous states. The capital costs of these reductions would be largely funded by a one-tenth-of-a-cent per-kilowatt-hour tax on non-nuclear electricity generated in the 48 contiguous states and all electricity imported into the United States. The bill also required the 50 largest emitting power plants, located primarily in the midwest, to reduce sulfur dioxide emissions by installing scrubbers on their smokestacks. Ninety percent of the installation costs of these scrubbers would be covered by the nationwide tax.

By spreading the costs of compliance over 48 states, no one state or region would be economically penalized. States that emitted the most sulfur dioxide, primarily in the midwest, would have to reduce the most. Furthermore, requiring scrubbers removed the incentive to switch to low-sulfur coal, thereby protecting jobs in the high-sulfur coal mining states.

Despite the new approach, these bills, like the ones in the 97th Congress, died at the end of the congressional session. The acid deposition control bills introduced in the 99th Congress were, in large measure, similar to the ones drafted in earlier years. And even though one of them was co-sponsored by more than 150 house members, at no time during the 99th Congress did it appear that a control bill would be passed. The opposition was too strong, and most of the arguments were familiar, including claims that the bills were too costly, not supported by scientific evidence, and that they unfairly penalized the midwest.

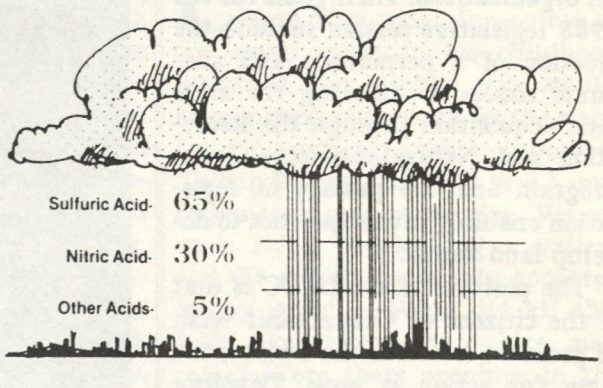
IT HAS BEEN ESTIMATED THAT 4,000,000 metric tons of sulfur dioxide are exported each year from the United States to Canada, nearly four times more than Canada exports in return. Thus, Canada argues that much of the acid deposition which falls within its borders, and damages its environment, originates in the U.S.

At the March, 1986, summit meeting between President Reagan and Prime Minister Mulroney of Canada, the two leaders endorsed a report by U.S. and Canadian envoys calling for an American-sponsored, five-year, five-billion-dollar project aimed at developing innovative control technologies for acid deposition. Despite this endorsement, President Reagan didn't take any action to make the project a reality for over a year.

WHAT ARE THE PROSPECTS, then, for the future? The proponents of immediate controls have introduced a number of acid deposition control bills into the 100th Congress. Among these is one co-sponsored by Senator Lowell Weicker (R-CT) that would require significant nationwide reductions in sulfur dioxide emissions to be achieved, in part, by retiring older, and often dirtier, coal-fired power plants. In addition, the bill would require reductions in nitrogen oxide emissions coming from motor vehicles. Another acid deposition control bill introduced into the 100th Congress and co-sponsored by Senator Christopher Dodd (D-CT) would also require major reductions in the emissions of both sulfur dioxides and nitrogen oxides nationwide.

Will any of the bills currently before Congress be passed? Although many observers feel that the evidence of damage from acid deposition is such that Congress will be forced to take action, there are those who disagree, notably Senate Majority Leader Robert C. Byrd (D-WVa).

What will happen in the future is anybody's guess. Political alliances change and new research may cast the acid deposition debate in a different light. But whatever happens, one thing is certain: Each and every citizen can affect the outcome by voicing his or her concerns about this important environmental issue.



TYPICAL NORTHEASTERN U.S. ACID RAIN COMPONENTS

In the eastern U.S., the major component of acid rain is sulfuric acid, followed by nitric acid, and then other acids in trace amounts. (From an EPA publication.) ■

Land Conservation
Are we doing enough?

by
Leslie Lewis
Citizens' Participation
Coordinator

LAND DEVELOPMENT in Connecticut has increased dramatically over the past two or three years. While we can regulate development through our planning and zoning, inland wetlands, and other state and local agencies, there is still a great need to protect unique features of the state's natural landscape and to provide open space for recreational purposes. Members of Connecticut's environmental community, concerned that the demand for land development will outstrip our ability to acquire and preserve natural areas, have formed the Land Conservation Coalition of Connecticut (LCCC).

The LCCC is comprised of representatives of over 20 environmental organizations. Their goals for the 1988 legislative session include the creation of a permanent and adequate source of funding for state land acquisition through the Recreation and Natural Heritage Trust Program and the passage of legislation enabling municipalities to develop land banks.

The position of the LCCC is that if the citizens of Connecticut wish to preserve land for the future, the time for action is now. Development pressure and soaring land values threaten our ability to acquire open spaces for recreational and conservation purposes. The quality of life many of us take for granted depends on those open spaces. Imagine hiking, swiming, birding, or boating, without large areas of public land available to all citizens.

SOME 200,000 acres of land, or about six percent of Connecticut's total acreage, has already been permanently preserved and is owned by the DEP. The DEP has set a goal of acquiring an additional 100,000 acres by the year 2000. In the meantime, an area the size of the town of Waterbury (20,000 acres) is developed each year. Land conservation in Connecticut is literally a race against the clock.

The LCCC hopes that all Connecticut citizens who value our state's natural heritage will join in its efforts to preserve and enhance it. If you are interested in finding out more about the Land Conservation Coalition of Connecticut contact them in Hartford at 527-8737.

Conservation and Development Finding A Balance

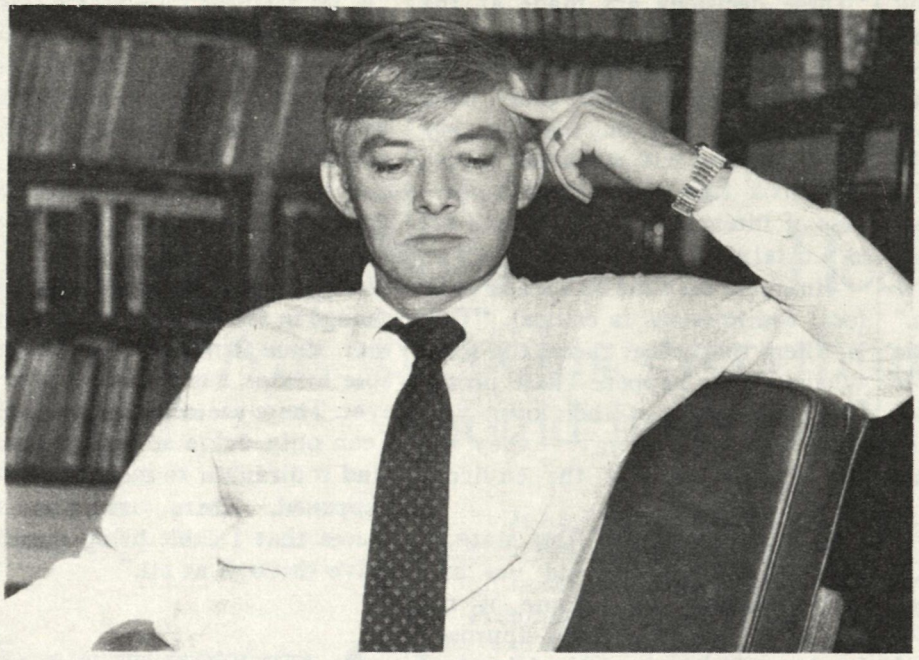
A conference is planned to discuss land use strategies, resource inventories, plans of conservation and development, regional efforts to protect significant resources, open space acquisition on the state and municipal level, public and private conservation partnerships, and tools for land preservation.

Friday, 26 February, 1988
Ramada Inn
Meriden, Connecticut

The conference is co-sponsored by: The Connecticut Association of Conservation and Inland Wetlands Commissions (CACIWC), the Connecticut Department of Environmental Protection, the University of Connecticut Cooperative Extension Service, and the Connecticut Audubon Society.

For further information, call CACIWC at 549-3094. ■

The quality of life that many Connecticut residents take for granted depends on open spaces. (DEP file photo.)



The DEP'S Jim Murphy: "It is important to perceive the world not in terms of arbitrary, man-made boundaries, but as a continuum of natural processes."

Jim Murphy: A Citizen of the Earth

by
Robert Paier

WE TRY -- within parameters, of course, within parameters -- to tell it like it is here at the *Citizens' Bulletin*. And so, the truth here is that the choice of Jim Murphy as the subject of this month's DEP profile had a lot to do with the fact that Jim is simply a good guy, a guy who makes not-so-great days a little more bearable, a guy who is good for a laugh. That last perhaps had most to do with it. Then there is fact that Jim is one of the many people in the DEP about whom it is said, "Boy, this guy really knows his stuff." Jim is very, very well versed in his chosen field. Then, there is the Viet Nam thing: Jim is a Nam vet. He did what he had to do -- without fanfare -- and then got on with the business of being a husband, father, and citizen. For this, Jim, and a couple of million other guys who have remained largely invisible, deserve a hearty, if belated, thanks.

All of this is true, and is, I think, good enough reason to introduce Jim to the larger readership of the *Bulletin*. But, there is something else going on here, something that becomes apparent when you sit down with Jim and listen to him, catch the flow of his thoughts, follow the direction of his mind. What you find is a man who personifies the ideals of what it means to be an environmentalist. You find a man who thinks -- and acts -- unselfishly, with a view to "future generations." You find a man who is, in fact, global in his thinking. "I think it is important," says Jim Murphy, "to perceive the totality of the world, not in terms of arbitrary, man-made boundaries, but as a continuum of natural processes and systems that must be approached with respect and humility. We have a finite time on this little planet, and our obligation is to use that time productively and responsibly."

LIKE MANY PEOPLE with a sense of purpose, Jim points to one small event in his childhood which, if you blinked, you would have missed, but which set the stage for everything that followed. "When I was about 12 or 13, my father took me out hunting. We sat on a ridge, overlooking a valley, and the question suddenly appeared in my mind -- What did all this look like before the white man came? Were there openings in the forest? Were there fields? What was it like before all this?" Taking a puff on his pipe, Jim smiles slightly. "What I've been doing ever since then is trying to answer that question. Still a kid wondering about nature."

From the beginning, Jim knew that he was an environmentalist. But, things happen, and his career was interrupted by a one-year tour as a medic in a Mobile Army Surgical Hospital in Viet Nam. What did he learn from all that? "I learned how important it is to become aware of the issues of the day, to take a stand, and not to allow yourself to be driven by events." Not bad. And, just on the outside chance that nobody has said it before, may we in the *Citizens' Bulletin* take this opportunity to express a heartfelt, "Welcome home, Jim Murphy."

IT WAS WHILE DOING GRADUATE WORK at the Yale School of Forestry that Jim's world view began to take shape. "Before that, I saw only disconnected, unrelated bits of information, but then a unity, a continuum of man and nature in dynamic balance became clear to me. I understood that the natural world is our friend. Now, when I go out and look at a new area for the first time, I'm making a new friend."

Jim signed up with the DEP in 1974 as assistant director of the Water Resources Unit. Since then, he has worked in many positions and capacities at the DEP, becoming intimately familiar with the wide spectrum of environmental issues in the state. Now, as principal environmental analyst in the Water Compliance Unit, his primary responsiblity is to manage the state's water quality standards and classification program. Ultimately, it is this program which is responsible for maintaining Connecticut's ground and surface water quality. Big job.

That is by no means all, however. Jim works closely with towns, assisting in putting together programs unique to the individual needs of individual areas. "The DEP does not control land use," he says. "These decisions are made at the municipal level. We respect the fact that the towns are autonomous and that they understand their own needs better than anyone else. My job is to point out what the future may look like, to heighten awareness of interrelationship, and to act as a catalyst for further work."

Jim feels the time he spends with local commissions is critical. "This is where the rubber meets the road, where things happen. These people give unselfishly of their own valuable time and energy -- they are the true trustees of the environment."

Connecticut is the first state to have an integrated land use and water quality plan. Some of the success of this coordinated approach has been the result of the labor and vision of Jim Murphy. This being the case, Jim is often called upon to present Connecticut's operation to other states.

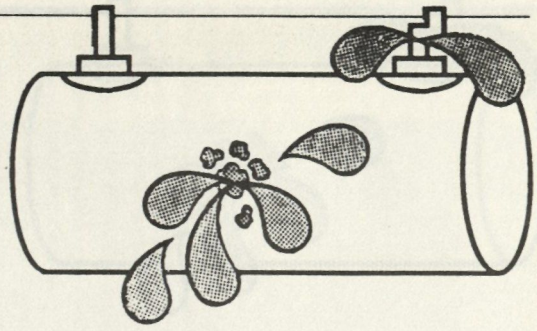
AND, FINALLY, there is *Environment/2000*, a major new plan offered by the DEP to the citizens of Connecticut. "*Environment/2000*," says Jim Murphy, "is the most important opportunity to bring about good and responsible change that I have had in my life. I consider myself fortunate to be here, in this time and place, and to be a part of that plan." For Jim, *Environment/2000* is a true expression of the continuum of nature, of man, of responsibility that he has long been aware of. "When I first read the statute defining the mission of the DEP and the need for formulating a statewide plan, I was stunned," says Jim. "It was all there. The writers of that statute saw it all clearly from the beginning. To be a steward of the environment for present and future generations; that is the great mission and opportunity of *Environment/2000*."

JIM MURPHY IS AN OPTIMIST. He sees opportunity , a chance for people to come together, to do something that has never been done before. On the other hand, with environmental awareness goes a certain sadness. "Aldo Leopold wrote that this kind of sensitivity can also be a curse," says Jim. "Sometimes, as I drive along, I see a change in the landscape, and I know that some irreplaceable, irretrievable habitat has just been lost forever. There are actually some places I can only drive at night, because I find it difficult to look at what has happened. There are also some places that I can't bring myself to drive through at all."

AND, BECAUSE it is such a big part of the Jim Murphy story, and to make absolutely sure that it not get lost in the shuffle, it must be reiterated here that Jim Murphy is a very, very funnny guy. He is one of many in the DEP who can switch from the deadly serious to the outrageously funny without missing a beat. And, since we're going after the truth, it should also be said that Jim's language echoes with rhythms and special vocabulary of a basic training barracks. Jim is, ultimately, a guy who does not take himself too seriously. "The real joke in all this is on me," he seems to be saying, "and isn't it a riot?"

Jim feels he is lucky to be able to work as a professional in the field he loves and feels is so important. "The time is right for environmental awareness," he says. "Aldo Leopold saw all these things before, but the time wasn't right. I'm just lucky to be at the right time with an opportunity to work with the right people."

Maybe. But it is also true that the state of Connecticut is lucky to have a guy like Jim Murphy operating in the general area. ■



Storing Your Home Heating Oil

Are you doing everything you should be doing?

by
John Cimochowski
Senior Environmental Analyst
Local Assistance and
Program Coordination Unit

HOME HEATING OIL is typically stored on-site either in 275-gallon in-basement tanks or in underground storage tanks. Many problems have been identified with in-ground storage tank use. Leaking tanks, supply lines, and overfill spills are the most frequently documented problems. In-basement tanks have also had leak-related problems, but of a much lower frequency. The typical leak-related problem associated with the in-basement tanks is a leak in the piping system which connects the tank to the furnace. These pipes are generally buried under the basement floor or in the concrete of the basement floor itself. To a lesser extent, corrosion and metal fatigue from filling over a long period of time may also contribute to in-basement tank leaks.

Leaks associated with underground burial may go undetected for long periods of time or until gross quantities of product are unaccounted for, free product is observed in a water supply, or odors or evidence of fuel are detected in water supplies or basements.

The cause of underground tank leaks has been well documented in Connecticut and across the U.S. Improperly designed storage tanks and transmission facilities have been the primary reasons for such leaks or failures. Finally, with new design, installation, and use-related requirements for underground storage facilities, proper maintenance is required to assure protection against leak problems.

UNTIL RECENTLY, the typical underground storage tank was of steel construction and had an outside coating of either red paint primer or black asphalt. These tanks had a warranty of usually one year, which afforded protection against manufacturing defects, but not leaks. The tanks were designed to provide safety from fire and explosions by getting the tanks out of buildings and above-ground settings and burying them below ground. This, however, created a new problem – environmental damage from leaking tanks and transmission lines. Also, in instances where tanks have in fact leaked underground, the product has sometimes found a secondary conduit -- such as a storm sewer or floor drain – and has resulted in fire and explosion incidents.

The reason for the failure of steel tanks and piping is generally corrosion of the outside surface. Such tanks are referred to as "bare steel," or "unprotected," as there was no method of preventing the external corrosion on these surfaces. Under certain conditions, such as moisture build-up, internal corrosion will also take place. The corrosion process is dependent on among other things, moisture content, electrical resistivity, pH and soil composition. The in-basement or above-ground tank with a buried fuel line faces the same risk of piping corrosion as the buried tank system.

New corrosion-resistant tank designs and specified installation requirements now minimize the risk of corrosion.

TO REDUCE THE RISK of underground leaks, certain maintenance and monitoring functions should be performed. Systems that protect metal

tanks against corrosion (called cathodic protection) require such monitoring and maintenance. In single-wall construction, there should be some means of periodically monitoring the system. There should also be a means of preventing overfill spillage. No longer can the underground fuel storage tank be considered "out of sight, out of mind." Now, what is required is the recognition and acceptance of responsibility on the part of the owner or operator.

WHILE THE EXPENSE IS SIGNIFICANT, double-walled construction alleviates most risk and maintenance requirements. The tanks and piping have built-in monitoring systems which are fairly easy to maintain. The difference between these systems and the "bare steel" tanks is a significantly higher cost for double-wall construction. The cost difference with the in-basement 275-gallon tank is even greater.

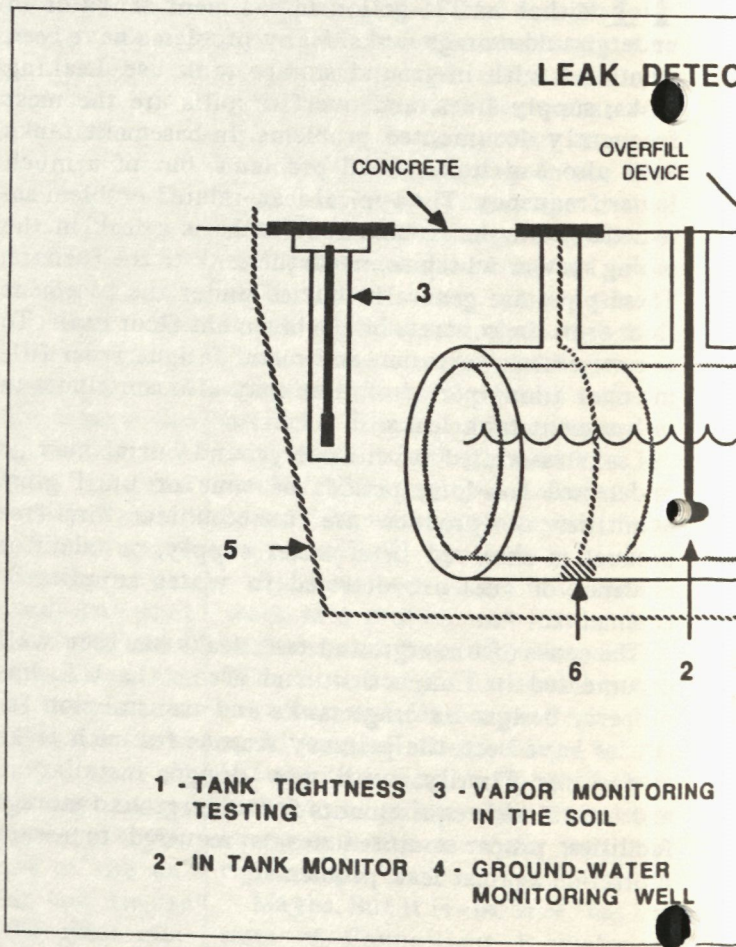
The homeowner/homebuilder may wish to evaluate the need for underground heating oil storage *before* committing to installation. In the recent past (1960s to early '70s), heating fuel was relatively inexpensive, and homes and heating systems were energy inefficient as compared to today's standards. It was convenient to have sufficient fuel stored, often up to 2000 gallons, to cover an entire year. Furthermore, fuel delivery could take place in the summer, at generally reduced prices.

The oil crises of the '70s dramatically increased the price of heating oil from 14 cents to one dollar per gallon. Summer purchase of large loads resulted in discounts and substantial savings. Large fuel storage capacity allayed fears of fuel oil shortages in winter months, further supporting the need for large underground tanks. In reality, during this crisis, there was no shortage of home heating fuel as long as the customer did not have a shortage of money.

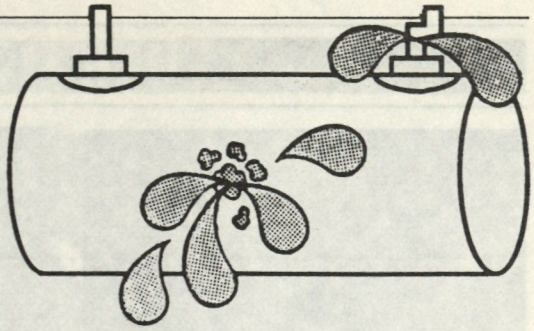
THE HIGH COST OF OIL and other sources of heating has brought about changes in the home heating and building construction industry. It takes less energy to heat today's buildings than buildings constructed in the past. Through grant programs, the federal government has provided incentives for making existing older buildings more energy efficient. Insulation and the use of solar energy have reduced the heating needs of newly constructed buildings.

The heating systems of the past had an associated combustion efficiency ranging from 50 to 60 percent. Today's heating systems range from 85 to 90 percent efficiency, or greater. Although the apparent benefit in an efficient system is lower fuel costs, the true use benefit is that less fuel is needed to heat the building.

When considering home heating fuel storage, one must now truly evaluate storage needs before com-

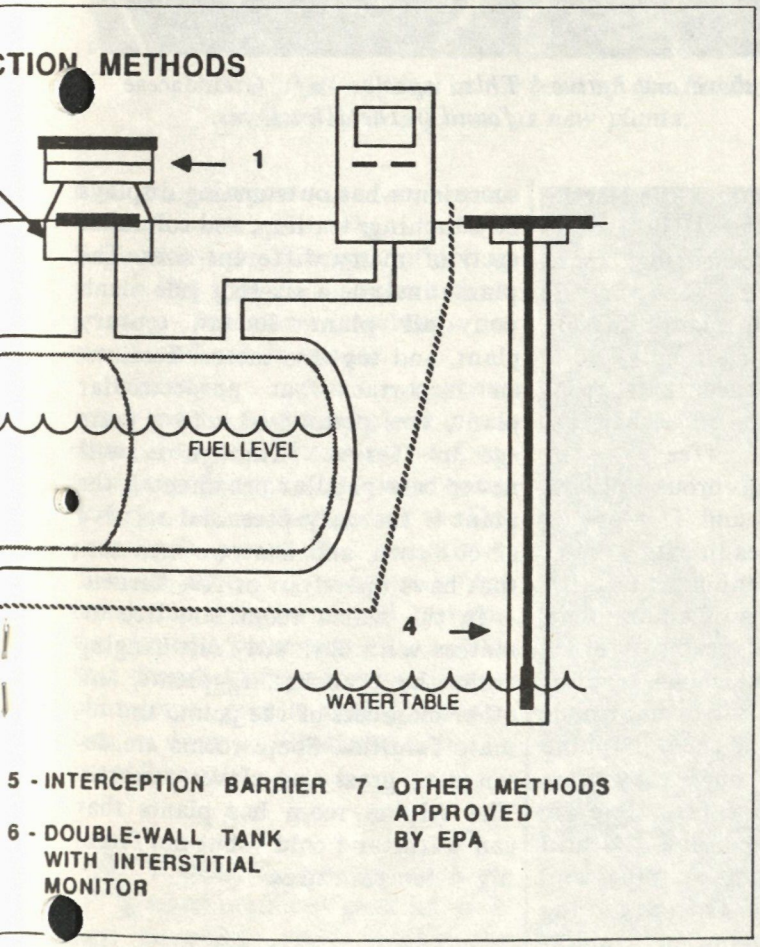


If you have an underground fuel storage tank, check it f Connecticut regulations.



mitting to underground storage of heating fuel. New state-of-the-art heating systems will not require significant fuel consumption over the course of a heating season. The costs, risks, and maintenance requirements associated with underground heating fuel storage places an additional burden on the homeowner. There may be no need for a 2000-gallon storage tank when annual fuel use is in the range of 500-600 gallons. One should also consider that if a 2000-gallon underground tank is consistently storing an average of 500-600 gallons of fuel, internal corrosion may take place in the unfilled portion of the tank. Should one then decide to fill the 2000-gallon tank, there is a probability that the tank will leak above the 500-600 gallon level. Condensation occurring above the filled level may also contribute to internal corrosion along the tank bottom -- water generated by this condensation accumulates along the tank bottom.

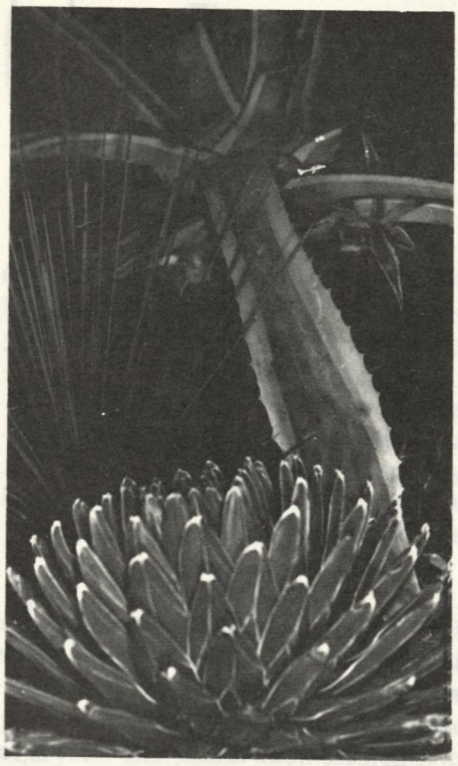
The 275-gallon tank does not represent the maximum storage capacity of in-basement tanks. Check with your local fire marshal if you desire additional in-basement storage heating capacity.



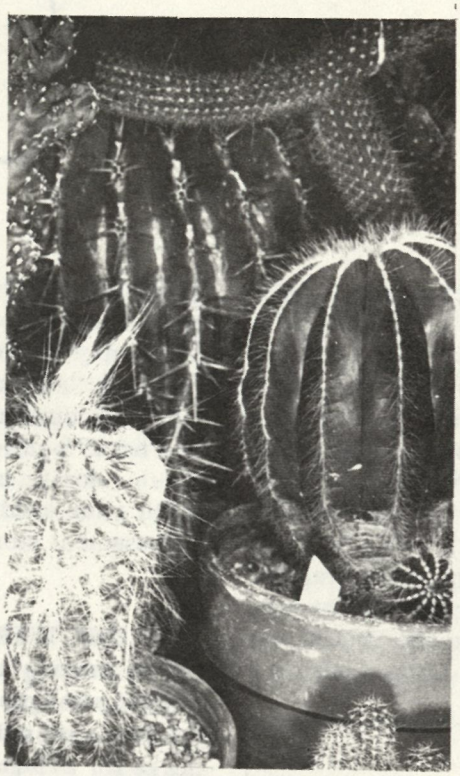
or leaks. If you are considering one, make sure you know the

IF ONE WERE TO PROPOSE in-basement storage of heating oil, how could the underground (or in-concrete) piping problems be resolved? Two alternatives can reduce or eliminate the risk of piping leaks for 275-gallon in-basement tanks. The first is to simply lay out the fuel line above the floor at the ceiling level of the basement. A second alternative is to have a larger diameter plastic pipe set under the floor to reach the furnace from the fuel tank. This could be accomplished by running the fuel line along the corners of the floor and basement wall. If the fuel line must be protected from damage, it should be placed in a plastic sleeve and then covered with cement. For new construction, the plastic line should be set below (and extending the ends above) finished basement floor level *before* the concrete floor is poured. The fuel line piping and copper fittings between the tank and furnace can then be slid into the larger pipe. Should the fuel line ever rupture, the fuel is contained and the copper line can be easily replaced.

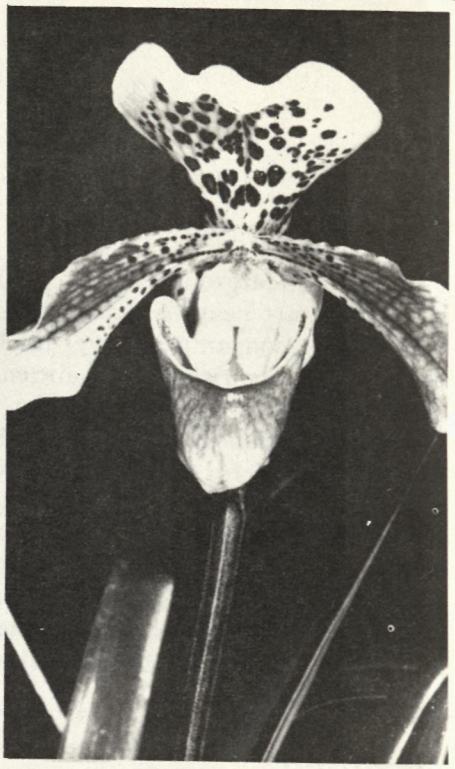
IF YOU HAVE AN UNDERGROUND fuel storage tank, you should consider checking it for leaks. If you are contemplating fuel storage for new construction or renovation work, evaluate fuel usage before committing to underground storage. And, if you feel underground storage is absolutely necessary, consider at a minimum the design standards of Connecticut's regulations. If you depend on a water supply well for your drinking water, you should consider double-walled construction for all underground tank and piping components. ■



Species of Agaves, *from Mexico, grow up to 20 feet tall.*



Cactaceae *pictured above are native to South America.*



This species of Orchidaceae *found in the Himalayas.*

An Exotic Bouquet

by
Carol Davidge
Public Information Coordinator
The Connecticut State Museum
of Natural History

FOR A CHANGE from snow and chill, try a visit to the biology greenhouses of the Department of Ecology and Evolutionary Biology at The University of Connecticut in Storrs which will take you instantly to the tropics or the desert southwest.

The greenhouses are open to the public Monday through Friday, from eight a.m. to four p.m. Group tours can be arranged for any day. These greenhouses contain two thirds of all the plant families in the world, one of the best collections of living plants in the Northeast. There are about 10,000 individual plants representing more than 3,000 species.

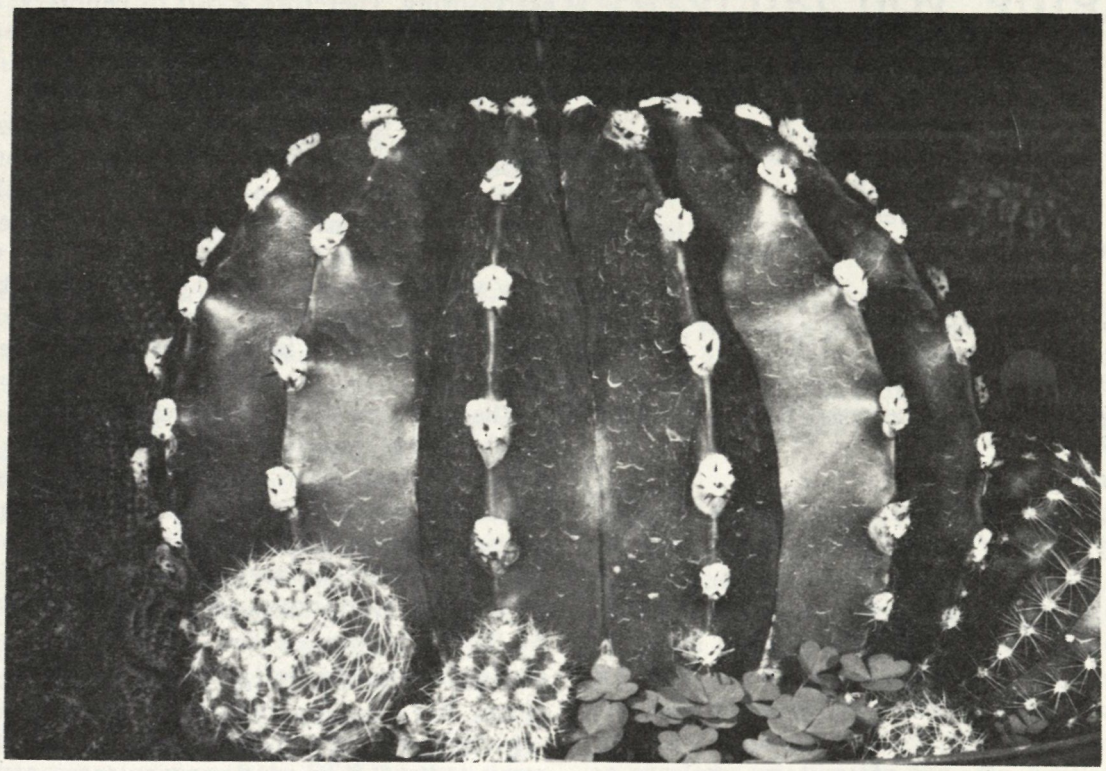
Rare and common plants include over 500 species of orchids, hundreds of cacti and succulents, tropical food plants -- such as banana, tea, cocoa, and coffee -- insect-digesting carnivorous plants, and tropical ferns and flowers of extraordinary shapes in every color.

A trip to the greenhouses usually evokes exclamations of amazement. Ten separate rooms create different climates. The warm, moist tropical rooms are filled with enormous green plants, most of them dripping with moisture as though they were in the tropical rain forest. Here are 20-foot tropical tree ferns, the bird of paradise, Dutchman's pipe, and other foliage plants. The only thing missing is the singing of tropical birds.

A sunny dry room for cacti and succulents has outstanding displays of bunching, trailing, and columnar cacti of many different sizes. The plants include a six-foot jade plant, pony-tail plant, loquat, century plant, and saguaro cactus. Teosinte, an important but unspectacular plant, was discovered a few years ago in Mexico. Although it will never be a popular ornamental, the plant is the only perennial relative of our corn, and has two-inch ears that have only four or five kernels.

In the warm rooms are tree tomatoes with dark red fruit hanging from the branches, eggplants, and other members of the potato and tomato families. Some rooms are devoted to grass and clover research. The Alpine room has plants that can withstand cold -- but not freezing -- temperatures.

VERY FEW UNIVERSITIES in the United States have facil-



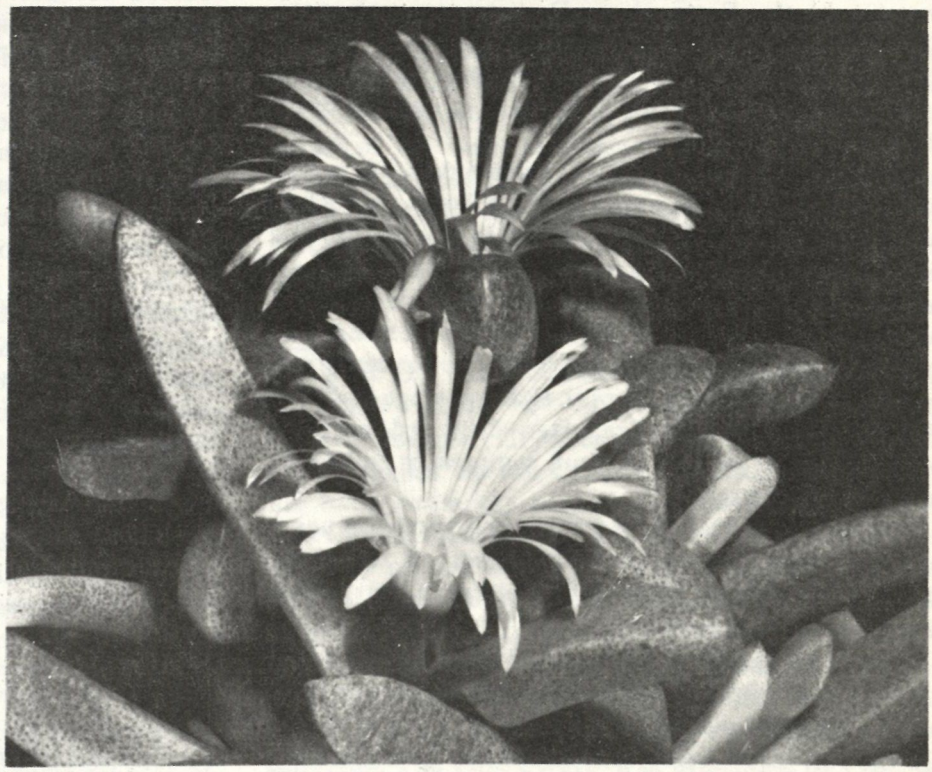
The small offsets at the base of the Echinopsis eyriesii of the family Cactaceae can be broken off and grown as new plants.

ities that surpass or even equal UConn's, and none other in New England has the diversity of living plants. The greenhouses serve three primary functions: teaching, research, and public service.

"Something special happens when you take a living plant into a classroom," said Ecology and Evolutionary Biology Professor Terry Webster, who is the head of the Department's greenhouse committee. "For example, if I bring in a fern frond that is twice as tall as I am, the students come alive in a way that doesn't happen if you show a photograph, give a verbal description, or draw an illustration on the board," he said.

AT UCONN, biologists are researching plant genetics, ecology, physiology, and competition among plant populations, as well as breeding plants to resist insects and

(*Continued on page 20.*)

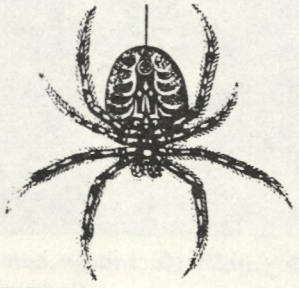


Pleiospilos, of the family Aizoaceae, from South Africa, look like pieces of rock and grow about as fast. (All photos by Carl W. Rettenmeyer.)

Anything been bugging you lately?

by
Kenneth A. Welch
Assistant Scientist
and
Carol R. Lemmon
Agricultural Technician
Connecticut Agricultural Experiment Station

What looks like soot and crawls?
Why are maggots on my ceiling?
What is making holes in my lawn?
Why are large black flies clustered inside my living room window?
Why is my cabbage wilting?
What is eating my bean leaves?



THESE ARE A FEW of the five to six thousand questions Connecticut citizens pose about insect-related matters to the Entomology Department each year. Questions come by telephone, in person, or by letter. Contrary to common belief, we do not have all the answers yet, nor have we heard all the possible questions.

The telephone rings up to 50 times a day during the busy season. Visitors enter bearing boxes, branches, bags, and bottles containing all kinds of critters. Our mail, consisting of letters and packages, can be a challenge. Questions may be written on anything from a corporate letterhead to a piece of torn paper bag. The specimens we find inside can be alive or dead, and range from whole to pepper-sized postage-machine shattered pieces. They are often disguised between pieces of sticky tape, in vacuum samples, or embedded in strands of cotton.

We have seen dead birds, snakes and turtles, slugs, a scorpion, head lice, three square feet of turf, tree limbs, small shrubs, imaginative pieces of lint, and a live black widow spider.

We often identify familiar specimens with a quick glance. Other times identification of rare insects may require several hours to several weeks, even with the aid of our insect reference collection, identification keys, scientific journals, entomology texts, and a dissecting microscope.

MANY QUESTIONS ARE SEASONAL and can be predicted. For example, the eastern subterranean termite and the black carpenter ant swarm in late winter or early spring. Therefore, a call in February, March, or April concerning swarming insects is probably about one or the other. The clover mite, also active in the early spring, looks like crawling soot.

Insects on the ceiling, which are often mistaken for maggots, are predictably Indian meal moth larvae. They crawl upward and across ceilings seeking shelter to form cocoons after they have completed feeding.

Other answers may be predictable, but the causes may vary. Moles and voles, grub-digging skunks and nut-burying squirrels, insect-feeding birds, and emerging Japanese beetle adults all leave holes in lawns.

The presence of some insects implies a secondary problem. Past experience has taught us that large flies inside a living room window are a species of blue bottle fly. Since their larvae feed on carrion, our immediate assumption is that a dead animal is nearby. A fireplace often harbors a bird or small mammal which has fallen down the chimney and died.

OTHER QUESTIONS may not be due to natural causes. For example: "Crickets" with short chirps at regular intervals commonly turn out to be smoke detectors signaling weak batteries.

The answers that seem to create the greatest distress: *It's a tick or It's a termite.* Ticks cause justifiable concern because they transmit Lyme disease, which recently became a reportable disease in the state. The presence of termites causes concern because of anticipation of the cost of control and repair. Fortunately, we can assure people that although the problem may need attention, there is no need for panic. To a lesser degree, avid gardeners are upset to learn their cabbage has wilted due to root maggot feeding or their beans have been skeletonized by the Mexican bean beetle.

The questions, in addition to allowing us to inform citizens about things that concern them, help our research because they may bring new pests to our attention. For example, a resident of West Haven was curious about a series of small, white, cotton-ball-like puffs lining the underside of branches of a hemlock tree. The branch she held brought to our attention that the hemlock woolly adelgid, a serious pest of hemlock, had entered Connecticut. Its ravages were reported in *Frontiers of Plant Science*, Spring, 1987.

We always wonder what question the next visitor, caller, or letter-writer will ask us. ■

(This article was reprinted from Frontiers of Plant Science, *the newsletter of the Connecticut Agricultural Experiment Station, Post Office Box 1108, New Haven, CT 06504. Readers with questions on insects are invited to write in or phone 789-7214. Ed.)*

Speaking Up for Connecticut's Outdoors

The Citizens' Advisory Council provides expertise and first-hand information to the DEP

by
Patrick L. Carroll

THE CITIZENS' ADVISORY COUNCIL, also referred to as the Council, or CAC, is a unique and important link in the DEP's communication with the citizens of Connecticut, providing advice, information, and vast expertise from people who know and understand Connecticut and its resources first-hand. The Council held its first formal meeting in October, 1975, with the stated goals of helping in the improvement of communications between the outdoor user and the DEP's Division of Conservation and Preservation, delineating problems that affect the user of outdoor recreational areas, and assisting the DEP in solving problems in regard to Connecticut's land and water resources.

How did the the Council get started? In 1975, Joseph Gill was commissioner of the DEP. At that time, legislation was proposed to set up a five or seven member advisory group to oversee the activities and operation of the Division of Conservation and Preservation. Commissioner Gill proposed a compromise, a non-legislative body with a maximum membership of 25, which would have a broader range of interest than the originally-proposed fish and game orientation. The new Council would speak for all facets of outdoor recreation, to include camping, snowmobiling, and birdwatching.

AT THE COUNCIL'S FIRST MEETING, such diverse groups as the Connecticut Audubon Society, Connecticut Horse Council, Connecticut Trappers Association, Bassmasters, Family Campers' Association, Connecticut Snowmobilers, Connecticut Archery Association, Connecticut Coon Hunters, Striped Bass Fund, Pattaquassett Muzzleloaders, Salt Water Flyrodders, and the Connecticut Forest and Park Association were in attendance, as well as members of the press. Many of those original members are still active in the Council today.

In addition to the above-mentioned goals, other rules were established at the first meeting. It was determined that members would be appointed by the commissioner of the DEP, upon recommendation of the sitting Council, and that membership would be for a period of three years, with no limit on the number of terms. Since that first meeting, the Council has met regularly once a month, and has continued to serve as a means of communication between outdoor enthusiasts and the state, and to act in an advisory capacity to the DEP.

WHAT BECOMES IMMEDIATELY APPARENT to anyone attending a meeting for the first time is the dedication, enthusiasm, and interest displayed by members of the Council. In spite of having to travel long distances in what is often the worst weather, members continue to make sure their individual positions are known and to live up to the goals and responsibilities of the group. Over the years, an excellent relationship has been developed between the DEP and the Council, clearly one of mutual trust and respect. On the other hand, there are members who feel that without actual legislative clout, sometimes things "fail to get done."

What has been accomplished by the Council since its inception in 1975 has been the very valuable and continual exchange of ideas between the DEP and the people of the state. Members of the Council are confident that their suggestions for improvements, for added personnel, for more and better equipment have indeed been taken seriously and in many cases have come to fruition.

ONE OF THE PROGRAMS in which the Council has taken a very active part is the Turn-in-Poacher (TIP) Program. The TIP Program was first endorsed by the Citizens' Advisory Group, and has been constantly supported by it. Another project was the establishment of the Milan J. Bull Award, in memory of one of the Council's former chairmen. When Milan J. Bull died in 1981, his fellow Council members decided to establish an award in his memory. The award is to recognize outstanding contributions in the fields of fish, wildlife, or other resource management, conservation, or related outdoor activities. The first award was presented, in 1982, to the Town of Vernon for the renovation of a recreation area at Walkers Reservoir, with full access for

CAC's Secretary Leonard Ertel (left) and Chairman Edward Kluck work through a busy agenda at a recent monthly meeting.

the disabled. A subsequent presentation was made to Edward Kluck, current chairman of the Council, in 1985. This award was in recognition of Kluck's involvement and leadership in the Housatonic Flyfisherman's Association, and in particular his aid to the DEP in the development of a trout management area in the Housatonic River.

RECENTLY, DEP COMMISSIONER Leslie Carothers addressed the Council. "I am looking forward to working with the Council," she said, "and drawing on the expertise of the members of the Council to help improve DEP programs."

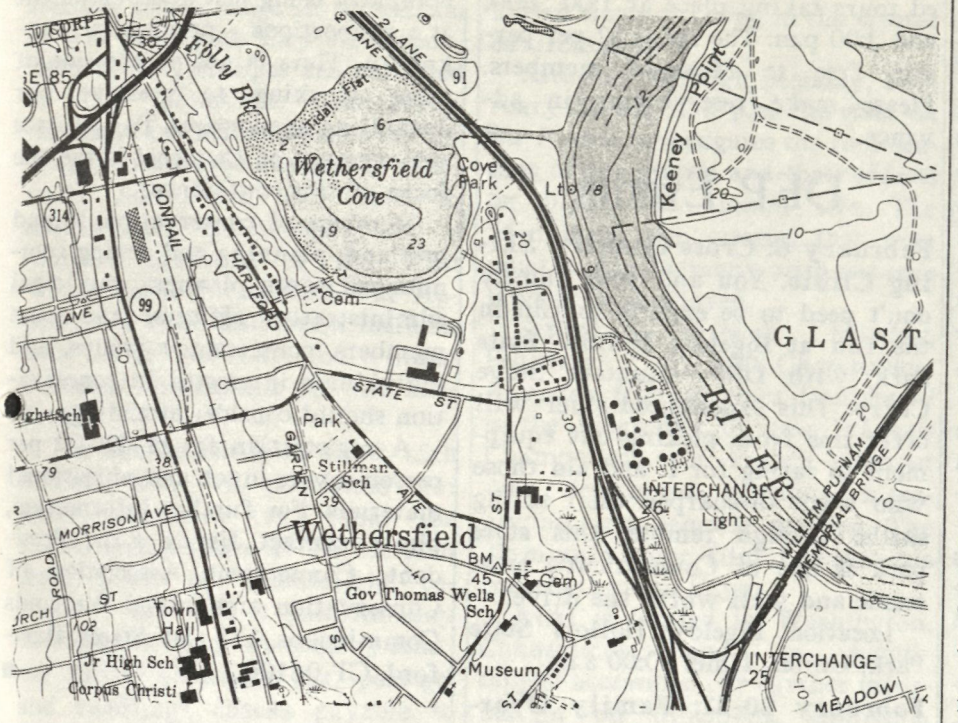
The roster of organizations represented in the Citizens' Advisory Council continues to grow. In addition to those previously noted, more recent additions have been Trout Unlimited, Connecticut Waterfowlers Association, Connecticut Handicapped Organized People, Connecticut Fly Fishermen's Association, Housatonic Fly Fishermen's Association, Connecticut Rifle and Revolver Association, Connecticut Sportsmen's Alliance, Farmington River Watershed Association, Fairfield and New London County Leagues of Sportsmen, Connecticut Wildlife Federation, and the Rockville and Bristol Fish and Game Clubs.

And, finally, no account of the Citizens' Advisory Council could be complete without making special mention of DEP Deputy Commissioner Dennis P. DeCarli. Since his appointment as deputy commissioner, he has involved himself fully in the activities of the Council, listening with respect to the concerns of members, doing what he could to make things better. The excellent rapport that exists between the Council and the DEP is in large part due to the efforts of Deputy Commissioner DeCarli.

THE CITIZENS' ADVISORY COUNCIL has a special place in the structure of the DEP. It is a flexible organization, with a dedicated, enthusiastic, and knowledgeable membership representing the great number of Connecticut residents who use and enjoy outdoor activities and facilities. Although the Council has no legislative status and is only advisory in nature, it is strong in its ability to act as the conduit between those who use the outdoors and those who are its managers. Working closely with one another, sharing concerns, strengthening the lines of communication can only result in greater mutual respect among those who use and those who manage the precious resources of our state. ■

The author has been a member of the Citizens' Advisory Council since its beginning and served as one of its earlier chairmen. He is currently in his ninth year as Connecticut's representative to the New England Fishery Management Council.

Map of the Month



On the joy of finding out what's in your own backyard

by
Alan Levere
Senior Environmental Analyst
Natural Resources Center

I MOVED. Ordinarily, I hear people talk about moving from one town to another. I moved from the Coventry topographic map to the Hartford-South topographic map.

At first, I thought I was moving to less than intriguing new environs -- too urban, not rural enough for my taste. I was wrong. It turned out, as usual, that there is more than enough diversity right in my own backyard to keep me busy for as long as I like. But I didn't know it until I took a close look at a topo map of the area.

The Hartford-South topo map reveals that I am close to, among many other features, some of the largest river meanders in the state on its namesake river -- the Connecticut. Large meanders by default mean large areas of flatland, and flat means floodplain, and floodplain means undeveloped land. There is plenty of that on this topo.

TWO MAJOR COVES of the river are represented. On the west side is Wethersfield Cove, which gets a lot of use from summertime boaters, and across the river, Keeney Cove is home to an excellent and diverse range of wetland soils and plants. At one time I saw broom corn growing in the floodplain at Keeney, the type the Colonists used to bind into sweep brooms. And Keeney Cove is a nice place to start a walk down to the river.

The results of the continued quarrying that has been a part of the Connecticut's Central Valley for over 340 years are depicted in many locations on this map, not the least of which is on Cedar Mountain in Newington. In addition, a large expanse of glacial striations -- marks left by rocks and boulders that were dragged along under the moving glacier -- can be seen on the exposed bedrock in the abandoned quarry just northwest of the ferry landing, by the railroad tracks.

And there are far more wetlands and swamps that need casual investigation than I thought existed in this area. The largest of these is an expanse drained by Collier Brook just southeast of the Route 5/15 and 175 junction. Extents of classic red maple swamp and alluvial marshes are present, occurring in the towns of Wethersfield and Rocky Hill.

Even though I know they exist, it still seems odd to see tidal flats far enough north to be a Portland area river feature, but here they are, just squeezing into the southeast corner of the map. The Rocky Hill-Glastonbury Ferry, one of the state's two major ferry systems, has its western terminus here in Rocky Hill.

IN ALL, THIS TOPO MAP covers an area of approximately 55 square miles, and includes all or part of nine towns. All of these features, and many others, are mapped out on the topo in a combination of five colors and nearly endless combinations of symbols. Confusing? Not really. I get far more confused without one!

If the Hartford-South topo catches your interest, you can order by sending $4.69 (2 copies $7.38) to cover the map, tax, and handling to: DEP-NRC, Map Sales, Room 555, 165 Capitol Aveune, Hartford, CT 06106. ■

The Bulletin Board

Bouquet

(*Continued from page 15.*)

disease. One scientist is studying aquatic plants, including purple loosestrife, which is beginning to clog Connecticut wetlands. He hopes to learn if there are natural ways to control this invasive pest plant. Another scientist studies the potato family, the fourth most important food species in the world, after rice, wheat, and maize (corn).

UConn's biologists also share plants from the greenhouses with other researchers from other nations. "Like Kew Gardens in England, we have a list of our plants which scientists from around the world can order from us," said Webster. Whenever UConn's botanists visit other botanical greenhouses, they take plants to share. The greenhouses' rare plants are valuable not only because they exist in only a few places in nature, but also because if they disappear from their natural habitats, the plants from the greenhouses can be used to restore the plants in nature.

DURING AN ORDINARY DAY in the greenhouses, it is common to see students working on their experiments, professors escorting visiting scientists, and residents from Connecticut and elsewhere wandering amid the greenery. The public is invited to come and see the remarkable collections. The greenhouses are adjacent to the Torrey Life Sciences Building at UConn. Guided tours may be arranged for a small fee by calling The Connecticut State Museum of Natural History – 486-4460. The best time to visit the greenhouses is when the weather outside is frightful because, without air conditioning, they do tend to get very hot in summer.

The greenhouses will be open on Sunday, March 6, 1988, with guided tours taking place at 1:00, 2:00, and 3:00 p.m. The fee is $2 per person, free to Museum members. Please make reservations in advance. ■

DEP Events

February 6: Cross Country Skiing Clinic. You and your family don't need to be experts to join in the fun at Bigelow Hollow State Park with DEP volunteer Steve Curry. This experienced skier will offer tips from picking out equipment to caring for it and aid those who want to sharpen their skiing skills. Though remote, this state park is one of Connecticut's most scenic and well worth the drive.

Location: Bigelow Hollow State Park, Union. Time: 10:00 a.m.

February 20-21: Family Overnight Winter Weekend. Spend two days learning about the winter outdoors with some of the best naturalists and environmental educators in the state. You will stay in the warmth and comfort of Channel 3 Country Camp, a winterized facility, where you will enjoy a weekend of fun and learning. All meals and lodging will be provided at $25.00 per adult and $20.00 per child (age 16 and under). *Pre-registration required.* Call 566-8108 or write to: Family Winter Weekend, 165 Capitol Ave., Room 108, Hartford, CT 06106 for more information and pre-registration package. ■

Conservation Conference

A conference on "Conservation and Development: Finding a Balance" will be held on Friday, February 26, 1988, at the Ramada Inn in Meriden.

Connecticut's natural heritage of woodlands, wetlands, wildlife habitat, and prime agricultural land is rapidly being lost to development at proportions previously unknown. Time is not on the side of those working to preserve our dwindling open spaces. To facilitate achievement of that goal is the the focus of this conference.

Members of conservation, inland wetland, planning and zoning commissions, town planners, municipal administrative officers, land trust members, conservancy groups, and individuals interested in conservation should consider attending.

A registration fee of $20.00 per person covers lunch and educational materials. For further information, please contact Nancy Kriz, President, Connecticut Association of Conservation and Inland Wetlands Commissions, 118 Oak Street, Hartford, CT 06106. ■

Connecticut Walk Book

The 15th edition of the *Connecticut Walk Book*, published by the Connecticut Forest and Park Association, is now available from area bookstores and wilderness shops, the CFPA headquarters, and via mail from the Connecticut Forest and Park Association, 16 Meriden Road, Middletown, CT 06457. The *Connecticut Walk Book* is the most comprehensive guide to hiking trails in Connecticut.

With 35 maps and trail descriptions detailed to the nearest tenth of a mile, the *Connecticut Walk Book* is a complete guide to more than 500 miles of the Blue-Blazed Hiking Trail System. It contains descriptive information about the trails, points of historical and geological interest, and scenic views.

The information in the 15th edition has been updated and revised to show trail locations at the time of publication. Since the 14th edition was published in 1984, 75 percent of the volunteer trail maintainers

reported some change in the section of trail for which they are responsible. Notable changes are indicated in the Mattatuck, Pomperaug, Nipmuck, and McLean Game Refuge Trails, with minor changes in other trails. Added are the Trails in southwestern Connecticut, and a southern extension of the West Woods Trails in Guilford. The Appalachian Trail description includes both the present route and a major relocation anticipated for the near future.

The Connecticut Walk Book, 15th edition, may be purchased for $12.90 (includes tax) from the CFPA headquarters at 16 Meriden Road, Route 66, Middlefield, between 9 a.m. and 4 p.m. Monday through Friday, or by mail by sending $15.00 (includes tax, postage, and handling), checks payable to Connecticut Forest and Park Association, to CFPA, 16 Meriden Road, Middletown, CT 06457. For additional information, call 346-2372. ■

AIAI Events

The following events are scheduled at the American Indian Archaeological Institute for the month of February:

Saturday through Monday, February 6-8, 2:30 p.m. *The Two Rivers*, a 60-minute color film that traces the political, economic, and cultural background of the contemporary clash of the "two rivers" in southern African life -- the blacks and the whites.

Saturday through Monday, February 13-15, 2:30 p.m. *The Red Balloon*, an Academy Award-winning fantasy of a boy and his "tame" balloon in Paris. It charms the viewer for 34 minutes without dialogue, but with exquisite color photography.

Saturday, February 20, 1:00 p.m. Winter survival walk: Dr. Edmund Swigart will discuss the American Indian ways of living in the winter environment.

Saturday through Monday, February 20-22, 2:30 p.m. *Survival on the Prairie* investigates the four seasons of the prairie and their effects on plant and animal life. The 55-minute film stresses that man must live in harmony with nature's laws or be destroyed.

Saturday through Monday, Februrary 27-29, 2:30. *Champollion: Egyptian Hieroglyphics Deciphered* is the biography of Jean-Francois Champollion, the French scientist who deciphered Egyptian hieroglyphic and demotic writing. The 32-minute color film includes his travels through Egypt.

AIAI is located in Washington, Connecticut, and is handicapped-accessible. For further information on directions, admission fees, and other events, please phone (203) 868-0518. ■

New Publications

A number of new publications of interest to Connecticut environmentalists are now in the planning stages. If any reader has information which might be pertinent to these projects, please contact any of the people noted below.

The DEP's Natural Resources Center is producing the third edition of *What's Legally Required*, which is designed to inform members of planning, zoning, zoning boards of appeals, and inland wetlands agencies of their required duties and legal constraints. A draft is being reviewed, and the publication is targeted for publication by the late spring of 1988. For additional information, contact Attorney Michael A. Zizka (522-5175) or Allan Williams (566-3540).

The DEP's Water Resources Unit and the Natural Resources Center are initiating the development of a river protection manual, designed to encourage towns to plan to protect their river resources. The project is scheduled for initiation in early February, with publication a little over a year later. For further information, contact Jay Northrup (566-7244), Allan Williams (566-3540), or James MacBroom (271-1773).

The Natural Resources Center and the Litchfield County Soil and Water Conservation District have initiated the preparation of an open space manual for municipal governments. The manual is being written to encourage municipalities to determine their open space needs, and to delineate open space protection techniques. The writing, editing, and publishing process is expected to take about a year. For further information, contact Geri Nebor (567-8288). ■

Trailside Botanizer

by
Gale W. Carter
Illustration by
Pam Carter

Trailing arbutus (*Epigaea repens*) is one of our earliest spring wild flowers, sometimes appearing as early as late February. It appears on sandy or rocky woodland banks, often under evergreens.

Arbutus grows very close to the ground, sending out creeping hair-covered stems. At intervals tough roots are sent downward as growth extends outward. Patches of arbutus sometimes reach a diameter of two feet.

Early in the year, the thick evergreen leaves appear dull and rust-spotted. By June, they are replaced by new, lighter green leaves.

The blossoming period for arbutus is from late February to May. Its white to pink tubular flowers have a very fragrant spicy odor, and are borne in either erminal clusters or from the axii of the leaves. The male flowers and female flowers are sometimes on separate plants. Its fruit is a five-parted capsule.

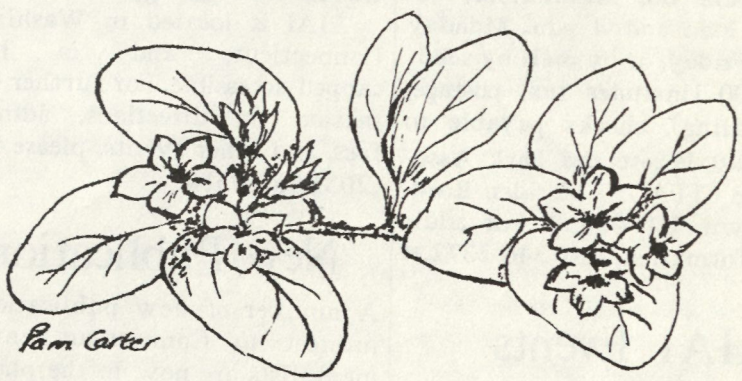
This species is sometimes referred to as "Mayflower" because legend has it that it was the first spring flower that the Pilgrims observed after their first dismal winter in America. However, it starts blossoming much earlier than May.

The common name, trailing arbutus, is a misnomer. It is apparently confused with an English evergreen arbutus with a similar flower but different type of fruit.

Both its generic and species name describe the creeping nature of the plant. *Epigaea* is derived from two Greek words, *epi*, meaning upon, and *gaea*, meaning earth.

Arbutus tea was once used for treating diseases of the urinary tract and kidneys, particularly for the treatment of stones in the kidney. The leaves and flowers were also used for treating malaria.

This species is on many conservation lists, and it is illegal to pick it in many states because of its rarity. ■



The Night Sky

by
Francine Jackson

When introducing stars to the celestial newcomer, we often mention star color such as "the flaming red eye of Taurus, the Bull," at which time the audience will usually say, "Right." Actually, it is true -- stars are different colors. Unfortunately, our eyes aren't capable of picking up the color very well, because they change focus rapidly (eyes do not accumulate light like film does), and they are most sensitive to yellow light, most probably because of our evolution near a yellow sun.

The February sky is ideal for testing your ability to detect star color. For instance, Aldebaran, Taurus' flaming eye, really is red, as is Betelgeuse, Orion the Hunter's shoulder. Rigel, Orion's knee, is a brilliant bluish-white, as is its neighbor Sirius, the brightest star in the night sky. Capella, high overhead in the constellation Auriga, the Charioteer, is yellowish.

In 1898, physicist Wilhelm Wein discovered the relationship between color and temperature. Now called Wein's law, it is simply, "the hotter an object, the bluer the radiation it emits." We can see this here on Earth by putting an iron poker in a fire. As it begins to heat up, it will first glow red, then orange, then yellow. If we continue to raise the temperature, the poker would appear white, or possibly white with a bluish tint. Match the color of the poker to the color of a star, and you can determine its temperature. For instance, Betelgeuse and Aldebaran, the red stars, are the coolest, about 3,000 degrees; Sirius and Rigel, at over 10,000 degrees, are the hottest and glowing at approximately 6,000 degrees, are Capella and our daytime star, the sun. ■

Letters to the Editor

Congratulations. Still the best, most informative reading material that flows into this household. Keep up your excellent quality.

Mrs. Bruce R. Anderson
Middletown

Thank you for the "Map of the Month" segment. I just spent a fortune at the map room.

J.P. Holthausen
North Guilford

Very enlightening.

H. Shoenburger
New Milford

My son is 11 years old and has done numerous reports using the *Citizens' Bulletin*. I enjoy the purity of the articles.

Robert Spino
Nauguatuck

Our children have used your *Bulletin* in researching school reports. Your articles are excellent.

Donald Fagan
Wilton

Your article in the December, 1987, *Citizens' Bulletin* explaining the Low Level Radioactive Waste Compact involving New Jersey and Connecticut was very informative. I would like to read some more about this crucial problem. Will you suggest a reading list, and give possible sources?

Mrs. Sylvester Deming
Cheshire

There is a vast literature dealing with this subject, some of it definitely not for the layman. Kevin McCarthy, director of the DEP's Radiation Control Unit, highly recommends "Report to the Congress in Response to Public Law 99-240," *as a comprehensive and understandable delineation of the current situation in regard to low level radioactive waste. It may be obtained by writing the National Technical Information Service, U.S. Department of Commerce, Springfield, VA 22161. Another excellent introductory work is* "Understanding Low Level Radioactive Waste," *published by the U.S. Department of Energy, Idaho Operations Office, Public Affairs Office, 550 2nd Street, Idaho Falls, ID 83401. Beyond that, there are many publications available from the Nuclear Regulatory Commission, Public Document Room, 1717 H Street N.W., Washington, DC 20555. It's very gratifying that the* Citizens' Bulletin *has aroused your interest in this terribly important subject. Ed.*

In regard to the article by Carol Davidge in "The Natural Historian," I thought it was prince's pine, not princess pine. Could I be wrong?

Samuel G. Dodd, M.D.
Mansfield Center

Carol Davidge, author of the article on the princess pine, stated that she was unable to locate a reference to Lycopodium obscurum *with a common name of prince's pine. However, in the* Manual of Vascular Plants of Northeastern United States and Adjacent Canada, *by Henry A. Gleason and Arthur Cronquist, D. Van Nostrand Company, 1965,* Chimaphila umbellata *is called prince's pine and pipsissewa. According to* A Field Manual of the Ferns and Fern Allies of the United States, *by David B. Lellinger, Smithsonian Institution Press, 1985,* Lycopodium obscurum *is sometimes called princess pine. There are, in fact, many common names of* Lycopodium obscurum, *one of which may well be prince's pine. If readers are aware of any other common names for this plant, please contact the Museum of Natural History, UConn, PO Box U-23, Storrs, CT or phone 486-4460. Ed.*

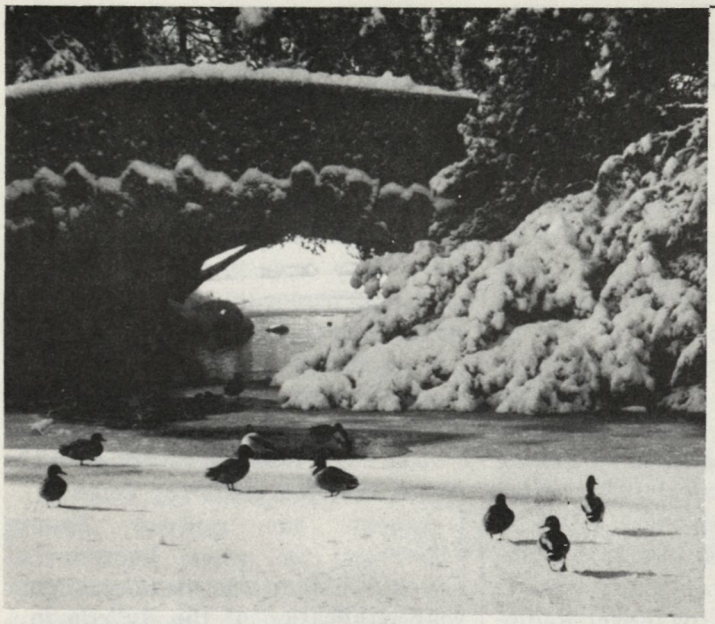
I would like to commend you on your publication of the *Bulletin* in the past months. I have been away at college and I've received copies of your magazine. I find them to be very informative and interesting. Since I don't make it home too often, it keeps me in touch with what's going on in Connecticut.

Stephanie Fadoir
Marymount College
Tarrytown, New York

Endnote

"The only valuable protest, or attitude, is one rooted in the uncertain soil of humanity. Remaining human -- in spite of all temptations and humiliations -- is the only way to hold your own against the Other, whatever that may be."

Elie Wiesel



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